

Equal-Weight and Fundamental-Weight Index Investing:
A Comparison of Two Smart Beta Strategies

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INTRODUCTION

Equal weighting and fundamental weighting are both smart beta investment strategies known to earn long-term excess returns over capitalization-weighted indices. Simple heuristics tend to generate returns that rival more complex quant strategies. For example, DeMiguel, Garlappi, and Uppal in their 2009 *Review of Financial Studies* article show that complicated optimization-based solutions often underperformed a simple equal-weighted strategy. The equally weighted or fundamentally weighted strategies are not, however, equivalent in their performance or their cost structure. The gross performance of equal-weight strategies falls behind that of the fundamental strategies largely because of the selection bias. The net performance is affected by transaction costs that grow much faster with the size of assets for equal-weight strategies.

In this paper, we compare the fundamental- and equal-weight strategies. We find that the gross performance advantage goes to the fundamental strategy largely because it both selects and weights stocks by a non-price based measure. (The equal-weight strategy selects the same stocks as the cap-weight strategy). The gap in net performance is even greater because the equal-weight strategy suffers from a more significant market impact due to higher turnover and a larger allocation to less liquid names.

PERFORMANCE CHARACTERISTICS OF FUNDAMENTALLY WEIGHTED AND EQUALLY WEIGHTED INDICES

Fundamental indexation has seen tremendous growth over the past decade. (For the fundamentally weighted strategy, we follow the definition proposed in Arnott, Hsu, Moore [2005].) However, there are other alternatives to capitalization weighting, most notably including an equal-weight strategy. Major index providers started offering equal-weight versions of their indices in the 1990s, and the last decade saw the emergence of ETFs and other investable vehicles linked to these indices.¹

For both strategies, we need to specify the number of constituents. The equal-weight strategy selects the constituents by market capitalization; the Fundamental Index[®] strategy by the fundamental score. Of course, as the number of constituents grows, the difference in the constituents between the two indices shrinks (if we were to use the entire universe, the constituents would be identical). To determine eligibility, we chose to use the 85th percentile by cumulative market capitalization (for the cap-weight and equal-weight strategies) or by cumulative fundamental weight (for the fundamental strategy), which leaves a modest amount of room for the selection effect to play a role.

Performance and volatility figures for the cap-weighted, fundamentally weighted, and equal-weighted strategies are set out in **Table 1**, which covers the G7 countries and Australia. (A more comprehensive table appears in the Appendix.) Table 1 also displays the smart beta strategies' tracking errors vis-à-vis the cap-weighted index.

Both smart beta strategies exploit the weakness of the cap-weighted index—its natural tendency to overweight companies that are overpriced by the market. Therefore, it is not surprising that both strategies consistently and materially outperform the cap-weight strategy. Nonetheless, there is a substantial difference in the performance of the fundamentally weighted and equally weighted strategies: the former outperform the latter in almost all countries, with an average return advantage of 1-2%.

An argument commonly proposed in favor of equal-weight strategies is the significantly higher diversification relative to the Fundamental Index strategy. However, diversification is not the ultimate goal

| TABLE 1. PERFORMANCE OF CAP-WEIGHT, RAFI, AND EQUAL-WEIGHT STRATEGIES BY COUNTRY (1985–2013) | | | | | | | | | |
|--|-------------|-------|-------|---------|------------|-------|-------|-----------|------|
| | PERFORMANCE | | | | VOLATILITY | | | TE VS CAP | |
| | CAP | RAFI | EW | RAFI-EW | CAP | RAFI | EW | RAFI | EW |
| Australia | 12.4% | 14.5% | 11.7% | 2.8% | 23.4% | 23.2% | 23.7% | 2.9% | 4.4% |
| Canada | 10.1% | 13.1% | 11.2% | 2.0% | 18.7% | 17.2% | 18.4% | 5.5% | 5.2% |
| France | 12.8% | 15.1% | 14.1% | 0.9% | 21.3% | 22.3% | 21.7% | 5.0% | 4.1% |
| Germany | 11.4% | 14.6% | 12.4% | 2.3% | 22.0% | 22.1% | 19.8% | 4.5% | 6.0% |
| Italy | 10.0% | 10.6% | 9.9% | 0.7% | 25.6% | 26.6% | 25.5% | 5.5% | 5.0% |
| Japan | 5.0% | 8.8% | 6.2% | 2.6% | 22.1% | 22.2% | 21.7% | 5.8% | 5.6% |
| United Kingdom | 11.7% | 13.7% | 12.6% | 1.1% | 18.0% | 19.3% | 19.2% | 4.4% | 4.5% |
| United States | 9.9% | 11.9% | 11.0% | 0.9% | 15.0% | 15.1% | 16.4% | 4.8% | 4.0% |

Source: Research Affiliates, LLC.

in itself; rather, it is a means to achieving the desired risk characteristics. And, as can be seen from Table 1, the volatility and tracking error of the equal-weight indices are in the same ballpark as those of the fundamentally weighted indices. It may be surprising that the much broader diversification of the equal-weight strategy does not ensure materially better risk characteristics. However, most of the benefits of diversification can be achieved with a relatively small number of stocks; reducing concentration further results only in marginal improvements.²

It is important to emphasize that much of the outperformance of the fundamental- versus equal-weight strategy is due to the selection effect. Capitalization as a criterion to select stocks for the equally weighted strategy favors the high price, potentially overpriced, stocks. The equally weighted strategy further exacerbates the potential problem of favoring overpriced stocks by giving them a significant weight in the portfolio. If we were to equal-weight the entire universe, the performance difference between the fundamentally and equally weighted strategies would shrink materially. In this case however, the equal-weight index would have a significant weight in many extremely small stocks, further increasing the market impact costs

IMPLEMENTATION CHARACTERISTICS

The costs of running an index-based strategy are largely composed of fees and market impact. Under competitive pressure, there is no reason to expect the fees to be very different; more importantly, the fees are likely to fall as the assets under management (AUM) grow. Beyond a certain level of investment, the market impact of trading represents the dominant share of transaction costs.

In estimating market impact, we follow the approach proposed in Aked and Moroz (2013), which postulates a linear per-security price impact and aggregates it across all the securities in the index. This approach predicts that:

1. the market impact on performance (in bps) is proportional to the aggregate AUM invested in the strategy by all investors; and
2. the scaling factor depends on both turnover of the strategy (primarily the turnover resulting from additions and deletions) and the “tilt,” or the degree to which index weights deviate from a trade volume-weighted index.

To obtain an estimate of the costs, then, we need to specify the amount of assets. In the following table, we show how the performance looks after adjustment for various amounts of AUM. An equal-

weight strategy has a larger turnover and a more pronounced tilt and, therefore, its net performance falls off with asset size much faster than a fundamental strategy.

Table 2 presents the impact of transaction costs on the performance of cap-weighted, fundamentally weighted, and equal-weighted indices at several levels of global AUM; the assets are allocated to the countries in proportion to the market cap in order to create a meaningful cross-country comparison of costs. Because the market impact model we utilize needs to be calibrated to a specific index, we standardize all results to correspond to a 50 bps market impact for the \$2 trillion in the U.S. market capitalization-weighted strategies. A more comprehensive version of Table 2 is presented in the Appendix.

| TABLE 2. NET OUTPERFORMANCE (1985-2013) | | | | | | | | | | |
|---|---|-------|-------|-------|-------|---|--------|--------|--------|--------|
| | EXCESS RETURN OF RAFI OVER CAP AT THE SPECIFIED GLOBAL AUM (\$B) | | | | | EXCESS RETURN OF EW OVER CAP AT THE SPECIFIED GLOBAL AUM (\$B) | | | | |
| | 0 | 100 | 200 | 500 | 1,000 | 0 | 100 | 200 | 500 | 1,000 |
| | Australia | 2.06% | 2.02% | 1.98% | 1.87% | 1.68% | -0.72% | -0.91% | -1.09% | -1.64% |
| Canada | 3.01% | 2.98% | 2.96% | 2.88% | 2.75% | 1.05% | 0.87% | 0.69% | 0.14% | -0.77% |
| France | 2.25% | 2.22% | 2.19% | 2.10% | 1.95% | 1.31% | 1.23% | 1.14% | 0.88% | 0.44% |
| Germany | 3.22% | 3.20% | 3.18% | 3.12% | 3.02% | 0.95% | 0.87% | 0.78% | 0.51% | 0.07% |
| Italy | 0.60% | 0.59% | 0.57% | 0.52% | 0.44% | -0.08% | -0.67% | -1.26% | -3.03% | -5.98% |
| Japan | 3.80% | 3.77% | 3.75% | 3.69% | 3.59% | 1.21% | 1.08% | 0.95% | 0.55% | -0.12% |
| United Kingdom | 2.02% | 1.98% | 1.95% | 1.84% | 1.67% | 0.97% | 0.81% | 0.65% | 0.17% | -0.64% |
| United States | 1.92% | 1.90% | 1.88% | 1.81% | 1.71% | 1.05% | 0.96% | 0.87% | 0.61% | 0.16% |

Source: Research Affiliates, LLC.

CONCLUSION

The net performance of equal-weight strategies suffers as the global size of assets grows into the hundreds of billions of dollars, eventually falling behind that of the cap-weight strategies. The fundamental strategies have materially stronger gross and net performance compared to the equal weight. The gross performance differences are driven mainly by the selection effect in the fundamental strategy. The net performance additionally benefits from the lower turnover and lower weight in low liquidity companies.

ENDNOTES

1. As far back as the 1970s, Wells Fargo launched a fund based on an equal-weight index of NYSE stocks. That experiment failed due to high turnover and the high brokerage fees prevalent at the time.
2. A portfolio whose top three stocks account for 60% of the weight can be greatly improved by reducing the concentration by half. A portfolio where the top three stocks account for 10% of the weight is already well-diversified, and reducing the concentration by half has little if any impact.

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APPENDIX

| TABLE A1. PERFORMANCE OF CAP-WEIGHT, RAFI, AND EQUAL-WEIGHT STRATEGIES BY COUNTRY | | | | | | | | | |
|---|-------------|-------|-------|---------|------------|-------|-------|-----------|-------|
| | PERFORMANCE | | | | VOLATILITY | | | TE VS CAP | |
| | CAP | RAFI | EW | RAFI-EW | CAP | RAFI | EW | RAFI | EW |
| EM | 5.9% | 16.0% | 7.8% | 8.3% | 24.5% | 26.4% | 24.1% | 8.3% | 3.6% |
| Austria | 11.7% | 17.0% | 11.9% | 5.1% | 25.2% | 24.7% | 23.9% | 6.8% | 5.2% |
| Australia | 12.4% | 14.5% | 11.7% | 2.8% | 23.4% | 23.2% | 23.7% | 2.9% | 4.4% |
| Belgium | 12.4% | 12.4% | 14.4% | -1.9% | 20.8% | 23.1% | 20.0% | 8.2% | 5.6% |
| Denmark | 13.4% | 15.7% | 13.8% | 1.9% | 19.3% | 20.9% | 19.5% | 6.8% | 5.7% |
| Finland | 6.1% | 8.5% | 6.5% | 2.0% | 31.5% | 26.3% | 26.8% | 15.5% | 14.6% |
| France | 12.8% | 15.1% | 14.1% | 0.9% | 21.3% | 22.3% | 21.7% | 5.0% | 4.1% |
| Germany | 11.4% | 14.6% | 12.4% | 2.3% | 22.0% | 22.1% | 19.8% | 4.5% | 6.0% |
| Greece | 4.9% | 8.2% | 5.2% | 3.0% | 37.0% | 40.6% | 36.9% | 12.0% | 11.5% |
| Hong Kong | 14.6% | 17.4% | 14.0% | 3.4% | 27.0% | 27.0% | 27.3% | 6.3% | 7.2% |
| Ireland | 12.8% | 11.8% | 14.7% | -3.0% | 22.2% | 32.7% | 24.1% | 21.3% | 10.2% |
| Israel | -9.2% | 7.8% | -1.7% | 9.5% | 33.9% | 25.8% | 30.9% | 28.2% | 20.5% |
| Italy | 10.0% | 10.6% | 9.9% | 0.7% | 25.6% | 26.6% | 25.5% | 5.5% | 5.0% |
| Japan | 5.0% | 8.8% | 6.2% | 2.6% | 22.1% | 22.2% | 21.7% | 5.8% | 5.6% |
| Netherlands | 12.2% | 14.2% | 12.5% | 1.6% | 19.5% | 22.0% | 18.8% | 5.7% | 4.4% |
| New Zealand | 5.9% | 4.9% | 7.0% | -2.1% | 24.7% | 26.8% | 25.5% | 8.3% | 6.6% |
| Norway | 12.4% | 15.2% | 10.1% | 5.1% | 25.9% | 27.0% | 26.1% | 5.8% | 7.8% |
| Portugal | 4.5% | 7.1% | 5.2% | 1.9% | 22.1% | 22.9% | 22.5% | 6.0% | 5.2% |
| Singapore | 10.0% | 13.4% | 11.7% | 1.8% | 25.0% | 27.3% | 27.6% | 7.0% | 7.2% |
| Spain | 7.7% | 11.3% | 7.5% | 3.8% | 23.8% | 25.1% | 22.8% | 11.2% | 5.9% |
| Sweden | 14.8% | 17.3% | 16.4% | 0.9% | 25.6% | 25.5% | 24.3% | 8.5% | 7.1% |
| Switzerland | 14.5% | 13.9% | 13.5% | 0.4% | 17.8% | 20.1% | 19.8% | 6.1% | 6.5% |
| United Kingdom | 11.7% | 13.7% | 12.6% | 1.1% | 18.0% | 19.3% | 19.2% | 4.4% | 4.5% |
| Canada | 10.1% | 13.1% | 11.2% | 2.0% | 18.7% | 17.2% | 18.4% | 5.5% | 5.2% |
| United States | 9.9% | 11.9% | 11.0% | 0.9% | 15.0% | 15.1% | 16.4% | 4.8% | 4.0% |
| Korea | 9.3% | 10.5% | 7.8% | 2.7% | 39.9% | 42.3% | 42.1% | 8.7% | 11.8% |
| Taiwan | 2.2% | 5.5% | 1.7% | 3.7% | 28.2% | 28.2% | 30.8% | 7.0% | 7.2% |
| Brazil | 8.7% | 15.6% | 9.4% | 6.2% | 38.6% | 37.4% | 36.5% | 11.1% | 10.1% |
| China | 7.5% | 11.3% | 8.1% | 3.2% | 41.4% | 46.6% | 43.6% | 14.3% | 10.5% |
| Russia | 11.8% | 9.7% | 18.2% | -8.4% | 48.1% | 46.6% | 41.2% | 23.3% | 19.8% |
| South Africa | 10.3% | 13.1% | 11.2% | 1.9% | 28.1% | 27.5% | 28.0% | 7.2% | 5.8% |
| India | 9.2% | 14.9% | 12.4% | 2.5% | 31.5% | 34.1% | 33.2% | 12.6% | 8.6% |
| Average | 9.3% | 12.3% | 10.3% | 2.1% | 26.5% | 27.3% | 26.3% | 9.2% | 7.7% |

Note: 1985–2013 for Developed Markets, 1997–2013 for Emerging Markets.
 Source: Research Affiliates, LLC.

TABLE A2. NET OUTPERFORMANCE

| | EXCESS RETURN OF RAFI OVER CAP AT THE SPECIFIED GLOBAL AUM (\$B) | | | | | EXCESS RETURN OF EW OVER CAP AT THE SPECIFIED GLOBAL AUM (\$B) | | | | |
|----------------|---|--------|--------|--------|--------|---|--------|--------|--------|--------|
| | 0 | 100 | 200 | 500 | 1,000 | 0 | 100 | 200 | 500 | 1,000 |
| | EM | 10.14% | 10.09% | 10.03% | 9.87% | 9.60% | 1.89% | 1.55% | 1.22% | 0.23% |
| Austria | 5.29% | 5.21% | 5.13% | 4.90% | 4.51% | 0.20% | -0.04% | -0.28% | -0.99% | -2.19% |
| Australia | 2.06% | 2.02% | 1.98% | 1.87% | 1.68% | -0.72% | -0.91% | -1.09% | -1.64% | -2.56% |
| Belgium | -0.01% | -0.06% | -0.10% | -0.24% | -0.46% | 1.93% | 1.75% | 1.56% | 1.02% | 0.12% |
| Denmark | 2.24% | 2.17% | 2.10% | 1.89% | 1.53% | 0.38% | 0.20% | 0.02% | -0.53% | -1.44% |
| Finland | 2.41% | 2.38% | 2.36% | 2.27% | 2.13% | 0.43% | 0.18% | -0.07% | -0.82% | -2.07% |
| France | 2.25% | 2.22% | 2.19% | 2.10% | 1.95% | 1.31% | 1.23% | 1.14% | 0.88% | 0.44% |
| Germany | 3.22% | 3.20% | 3.18% | 3.12% | 3.02% | 0.95% | 0.87% | 0.78% | 0.51% | 0.07% |
| Greece | 3.23% | 3.18% | 3.12% | 2.96% | 2.68% | 0.22% | 0.07% | -0.09% | -0.56% | -1.34% |
| HongKong | 2.75% | 2.68% | 2.61% | 2.39% | 2.02% | -0.66% | -1.27% | -1.89% | -3.72% | -6.79% |
| Ireland | -1.07% | -1.11% | -1.15% | -1.27% | -1.48% | 1.90% | 1.78% | 1.66% | 1.29% | 0.69% |
| Israel | 17.00% | 16.94% | 16.87% | 16.67% | 16.35% | 7.53% | 6.89% | 6.26% | 4.35% | 1.16% |
| Italy | 0.60% | 0.59% | 0.57% | 0.52% | 0.44% | -0.08% | -0.67% | -1.26% | -3.03% | -5.98% |
| Japan | 3.80% | 3.77% | 3.75% | 3.69% | 3.59% | 1.21% | 1.08% | 0.95% | 0.55% | -0.12% |
| Netherlands | 1.97% | 1.94% | 1.91% | 1.82% | 1.67% | 0.37% | -0.20% | -0.77% | -2.48% | -5.33% |
| NewZealand | -0.97% | -1.10% | -1.22% | -1.59% | -2.21% | 1.16% | 0.71% | 0.26% | -1.08% | -3.33% |
| Norway | 2.77% | 2.74% | 2.71% | 2.61% | 2.45% | -2.35% | -2.76% | -3.16% | -4.37% | -6.39% |
| Portugal | 2.51% | 2.47% | 2.42% | 2.29% | 2.07% | 0.62% | 0.53% | 0.44% | 0.16% | -0.30% |
| Singapore | 3.48% | 3.41% | 3.33% | 3.11% | 2.73% | 1.72% | 1.29% | 0.85% | -0.44% | -2.60% |
| Spain | 3.57% | 3.54% | 3.52% | 3.44% | 3.32% | -0.21% | -0.31% | -0.41% | -0.71% | -1.21% |
| Sweden | 2.53% | 2.51% | 2.48% | 2.41% | 2.29% | 1.67% | 1.55% | 1.44% | 1.09% | 0.52% |
| Switzerland | -0.60% | -0.64% | -0.67% | -0.77% | -0.93% | -1.04% | -1.20% | -1.36% | -1.84% | -2.63% |
| United Kingdom | 2.02% | 1.98% | 1.95% | 1.84% | 1.67% | 0.97% | 0.81% | 0.65% | 0.17% | -0.64% |
| Canada | 3.01% | 2.98% | 2.96% | 2.88% | 2.75% | 1.05% | 0.87% | 0.69% | 0.14% | -0.77% |
| United States | 1.92% | 1.90% | 1.88% | 1.81% | 1.71% | 1.05% | 0.96% | 0.87% | 0.61% | 0.16% |
| Korea | 1.22% | 1.17% | 1.12% | 0.96% | 0.71% | -1.48% | -1.71% | -1.95% | -2.64% | -3.79% |
| Taiwan | 3.26% | 3.17% | 3.09% | 2.84% | 2.42% | -0.49% | -0.86% | -1.24% | -2.36% | -4.23% |
| Brazil | 6.97% | 6.95% | 6.92% | 6.84% | 6.71% | 0.73% | 0.52% | 0.31% | -0.32% | -1.37% |
| China | 3.76% | 3.68% | 3.60% | 3.37% | 2.97% | 0.55% | 0.21% | -0.13% | -1.16% | -2.87% |
| Russia | -2.10% | -2.18% | -2.26% | -2.52% | -2.94% | 6.35% | 5.94% | 5.54% | 4.32% | 2.30% |
| South Africa | 2.81% | 2.76% | 2.71% | 2.56% | 2.31% | 0.94% | 0.79% | 0.64% | 0.20% | -0.54% |
| India | 5.70% | 5.65% | 5.59% | 5.43% | 5.16% | 3.15% | 2.74% | 2.33% | 1.10% | -0.95% |
| Average | 3.1% | 3.0% | 3.0% | 2.8% | 2.6% | 1.0% | 0.7% | 0.4% | -0.4% | -1.7% |

Note: 1985-2013 for Developed Markets, 1997-2013 for Emerging Markets.
Source: Research Affiliates, LLC.

Equal-Weight and Fundamental-Weight Index Investing

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